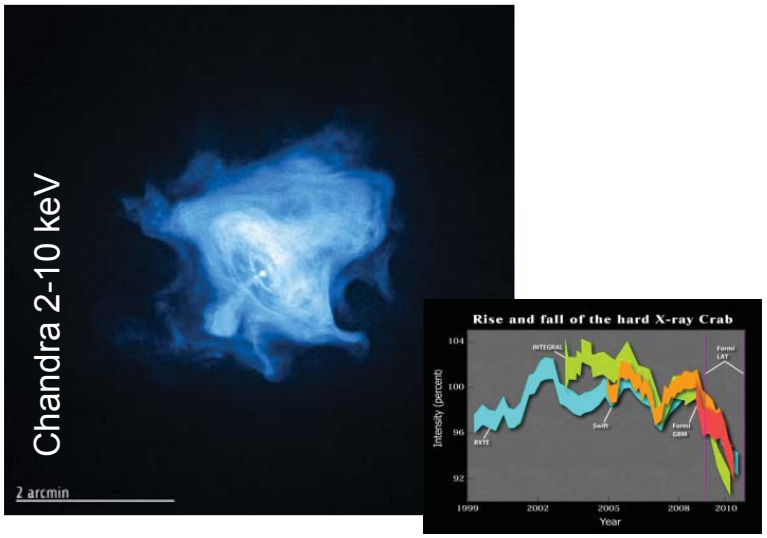
National Aeronautics and Space Administration

SCIENCE & TECHNOLOGY OFFICE

SuperHERO: Next Generation Hard X-Ray Focusing Telescope

NASA MSFC:	J. Gaskin, C. Wilson-Hodge, B. Ramsey, R. Elsner, A. Tennant
USRA/MSFC:	K. Kilaru, D. Swartz
NASA GSFC:	S. Christe, A. Shih
MIT:	F. Baganoff
RAL:	P. Seller, M. Wilson
NASA WFF:	D. Stuchlik

SuperHERO Science

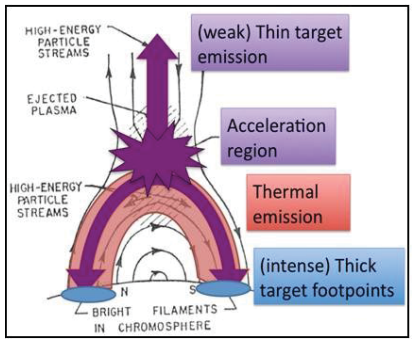


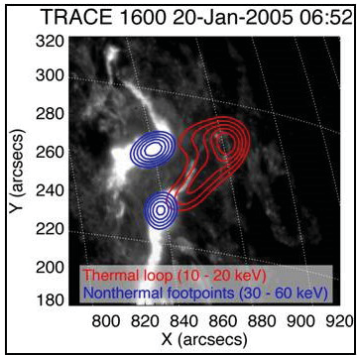
Astrophysics Goals

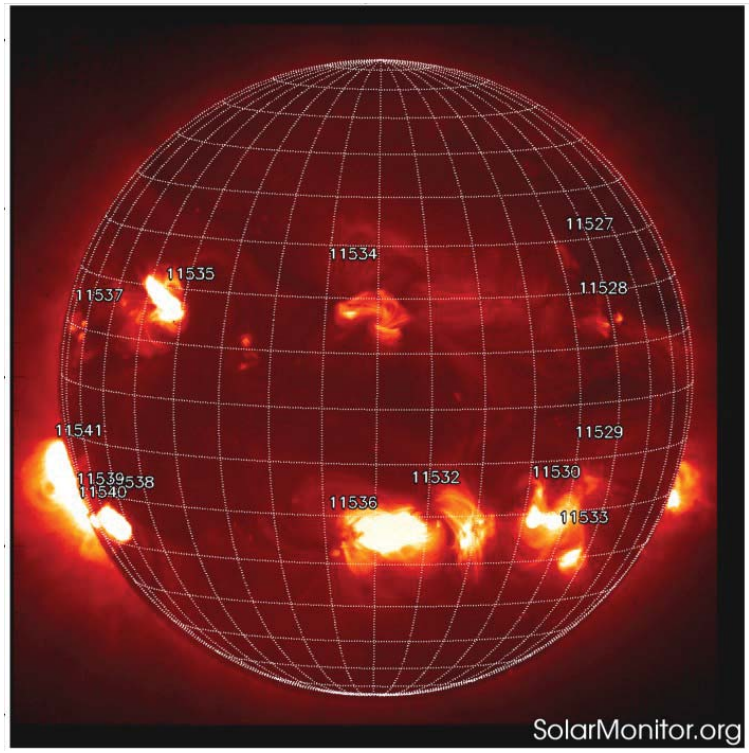
- Characterize spatial and spectral emission of a pulsar wind nebula.
- Investigate the scale of high energy processes in a pulsar wind nebula.
- Investigate the hard X-ray properties of astrophysical targets such as X-ray binaries and active galactic nuclei.
- Follow-up NuSTAR observations.

Solar Science Goals

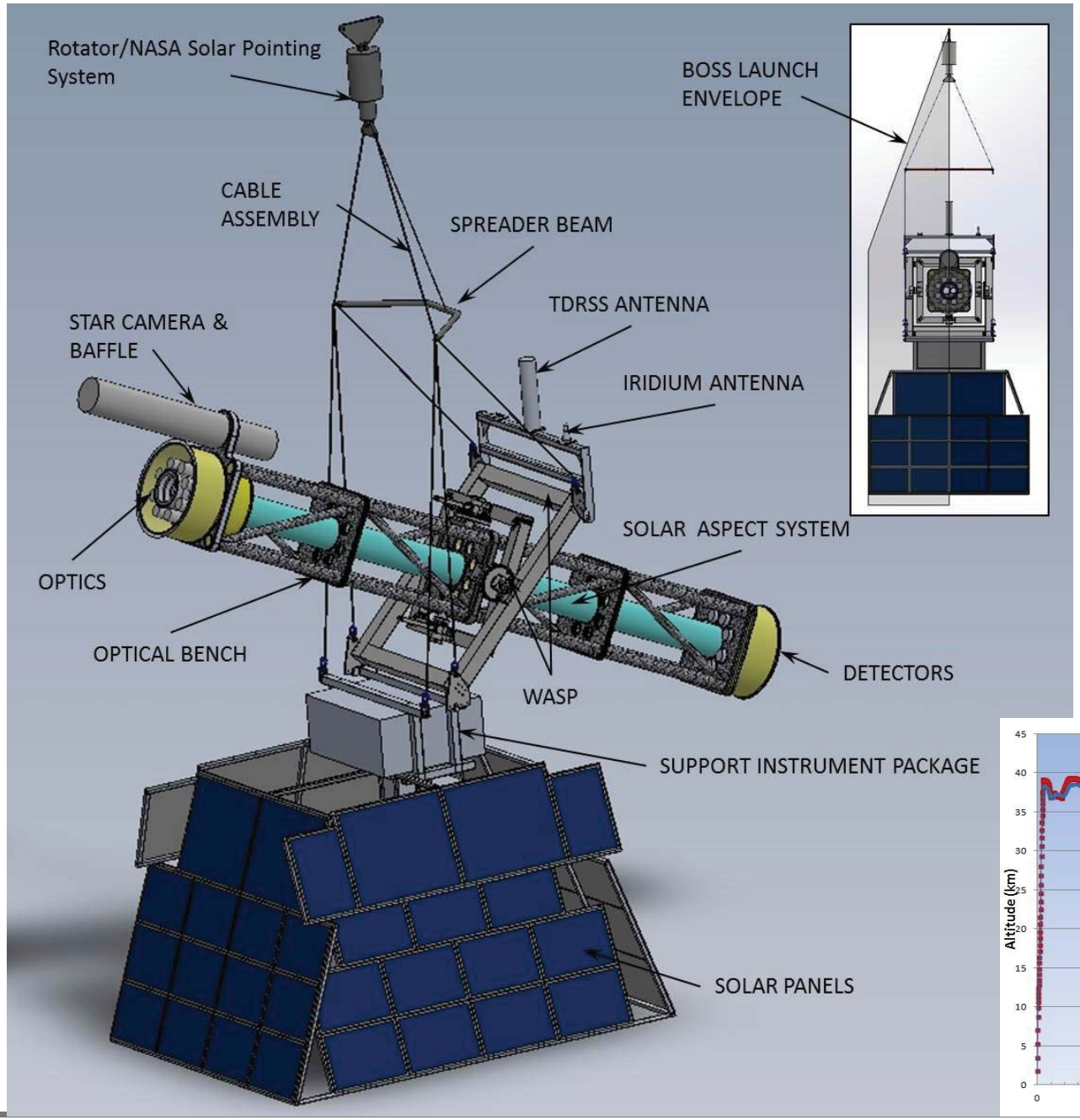
- Determine the presence of energetic electrons in the non-flaring solar corona.
- Determine the role of energetic electrons in solar flares.
- Characterize flare morphology relative to energetic electrons..



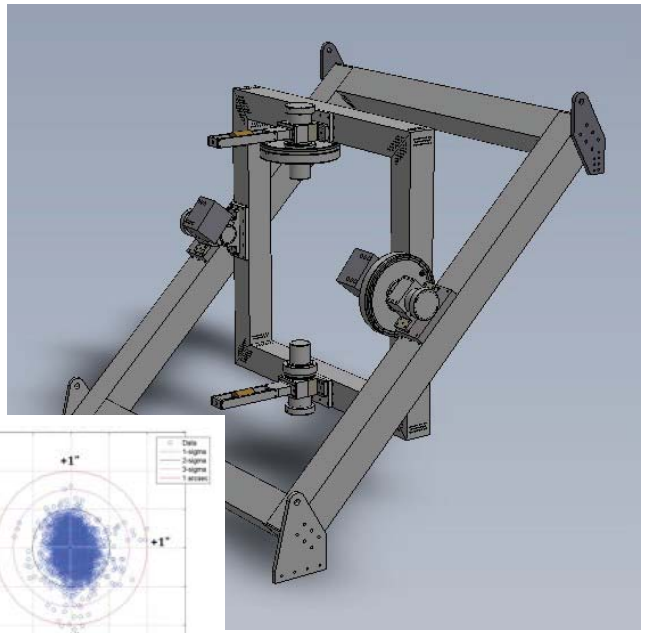




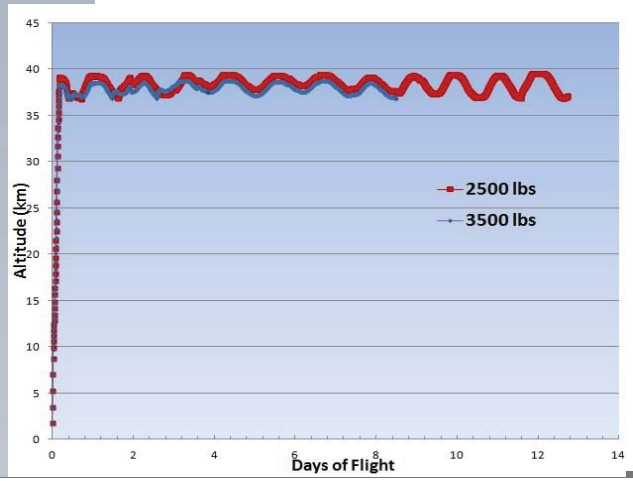
SuperHERO Balloon Payload Concept



Wallops Arc Second Pointer (WASP)

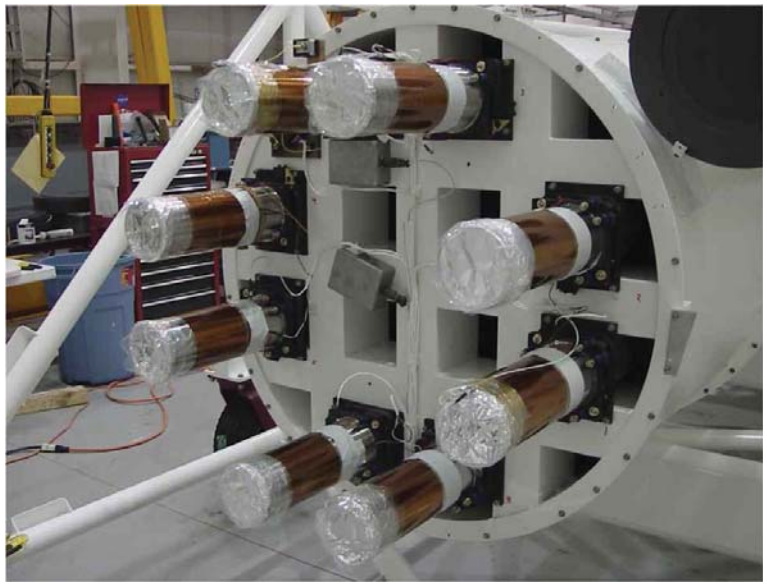


Possible LDB Flight Profile



X-Ray Optics at MSFC

Characteristic	
Mirror shells per module (8 modules total)	109 shells
Focal Length	6 m
Plate Scale	1.75 mm/arcmin
Mirror Coating	Iridium, 20 nm thick
On-axis geometric effective area	95 cm^2 at 40 keV 38 cm^2 at 60 keV
Angular resolution	20 arcsec (HPD) 7 arcsec (FWHM)
Field of View (FWHM)	9 arcmin at 40 keV 5 arcmin at 60 keV



Additional Efforts for Extended Capability

- **Multilayer Coatings**
- **Differential Deposition**

Complimentary Detectors – RAL/GSFC

Rutherford Appleton Laboratory (RAL) HEXITEC Fine-Pixel Detectors

Detectors	HEXITEC (CdTe)
Pixel Size	250 µm
Thickness	1 or 2 mm
Energy Resolution	1.3 % @ 60 keV
Array Size	~4 x 4 cm
Number of Pixels in Array	160 x 160
Max. Processing rate	10,000 evt s^{-1}